Micro Commercial Components
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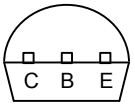
2N4402

PNP General Purpose Amplifier

Features

- This device is designed for use as general purpose amplifiers and switches requiring collector currents to 500mA

Pin Configuration
Bottom View



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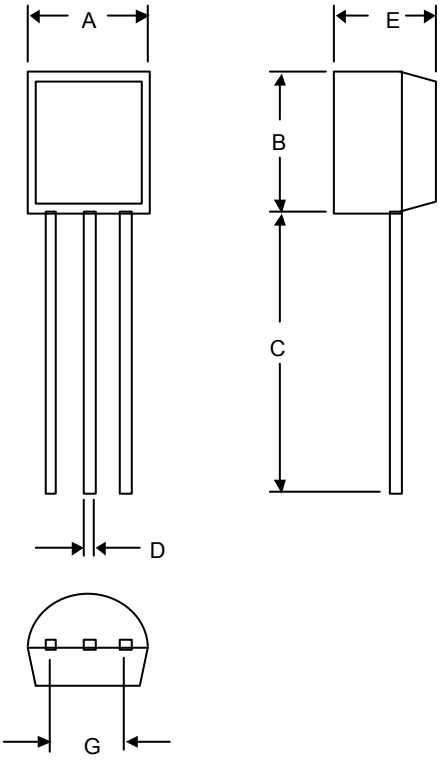

Maximum Ratings*

Symbol	Rating	Rating	Unit
V_{CEO}	Collector-Emitter Voltage	40	V
V_{CBO}	Collector-Base Voltage	40	V
V_{EBO}	Emitter-Base Voltage	5.0	V
I_C	Collector Current, Continuous	600	mA
T_J	Operating Junction Temperature	-55 to +150	^{O}C
T_{STG}	Storage Temperature	-55 to +150	^{O}C

Thermal Characteristics

Symbol	Rating	Max	Unit
P_D	Total Device Dissipation Derate above 25^{O}C	625 5.0	mW mW/^{O}C
$R_{\theta JC}$	Thermal Resistance, Junction to Case	83.3	^{O}C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	200	^{O}C/W

Electrical Characteristics @ 25^{O}C Unless Otherwise Specified

Symbol	Parameter	Min	Max	Units
OFF CHARACTERISTICS				
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage* (I_C=1.0mAdc, I_B=0)	40	---	Vdc
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage (I_C=100ì Adc, I_E=0)	40	---	Vdc
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage (I_E=100ì Adc, I_C=0)	5.0	---	Vdc
I_{CEX}	Collector Cutoff Current (V_{CE}=35Vdc, V_{EB}=0.4Vdc)	---	0.1	uAdc
I_{BL}	Base Cutoff Current (V_{CE}=35Vdc, V_{EB}=0.4Vdc)	---	0.1	uAdc

* These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.
Notes: 1. These ratings are based on a maximum junction temperature of 150 degrees C.
2. These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.

DIMENSIONS

DIM	INCHES MIN	INCHES MAX	MM MIN	MM MAX	NOTE
A	.175	.185	4.45	4.70	
B	.175	.185	4.46	4.70	
C	.500	---	12.7	---	
D	.016	.020	0.41	0.63	
E	.135	.145	3.43	3.68	
G	.095	.105	2.42	2.67	

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Symbol	Parameter		Min	Max	Units
	ON CHARACTERISTICS*				
h_{FE}	DC Current Gain				
	(V_{CE}=1.0Vdc, I_C=1.0mAdc)		30		
	(V_{CE}=1.0Vdc, I_C=10mAdc)		50		---
	(V_{CE}=2.0Vdc, I_C=150mAdc)		50	150	
	(V_{CE}=2.0Vdc, I_C=500mAdc)		20		
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage				
	(I_C=150mAdc, I_B=15mAdc)		---	0.40	Vdc
	(I_C=500mAdc, I_B=50mAdc)		---	0.75	Vdc
$V_{BE(sat)}$	Base-Emitter Saturation Voltage				
	(I_C=150mAdc, I_B=15mAdc)		0.75	0.95	Vdc
	(I_C=500mAdc, I_B=50mAdc)			1.30	Vdc
	SMALL-SIGNAL CHARACTERISTICS				
C_{OB}	Output Capacitance				
	(V_{CB}=10Vdc, f=140KHz)		---	8.5	pF
C_{IB}	Input Capacitance				
	(V_{EB}=0.5Vdc, f=140KHz)		---	30	pF
h_{fe}	Small-Signal Current Gain				
	(I_C=20mAdc, V_{CE}=10Vdc, f=100MHz)		1.5	---	---
h_{fe}	Small-Signal Current Gain				
	(I_C=1.0mAdc, V_{CE}=10Vdc, f=1.0KHz)		30	250	---
h_{ie}	Small-Signal Current Gain				
	(I_C=1.0mAdc, V_{CE}=10Vdc, f=1.0KHz)		0.75	7.5	KOHM
h_{re}	Small-Signal Current Gain				
	(I_C=1.0mAdc, V_{CE}=10Vdc, f=1.0KHz)		0.10	8.0	X 10^{-4}
h_{oe}	Small-Signal Current Gain				
	(I_C=1.0mAdc, V_{CE}=10Vdc, f=1.0KHz)		1.0	100	umhos
	SWITCHING CHARACTERISTICS				
T_d	Delay Time	V_{CC}=30Vdc, I_C=150mAdc,	---	15	ns
t_r	Rise Time	I_{B1}=15mAdc, $V_{BE(off)}$=2.0Vdc	---	20	ns
t_s	Storage Time	V_{CC}=30Vdc, I_C=150mAdc,	---	225	ns
t_f	Fall Time	I_{B1}=I_{B2}=15mAdc	---	30	ns

* Pulse Test: Pulse Width<300us, Duty Cycle<2.0%

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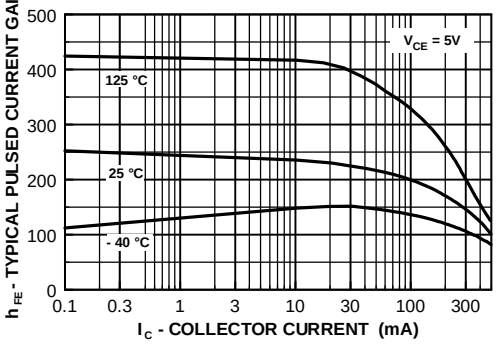
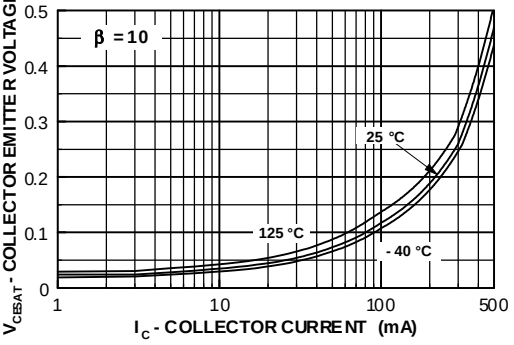
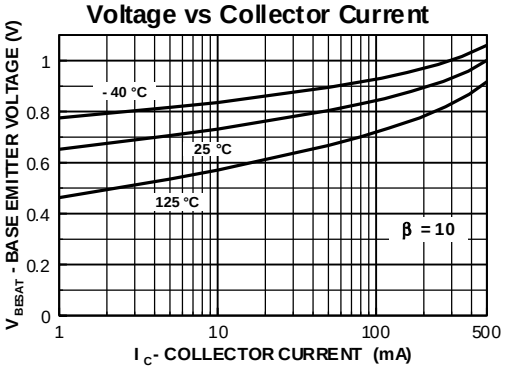
Typical Pulsed Current Gain vs Collector Current



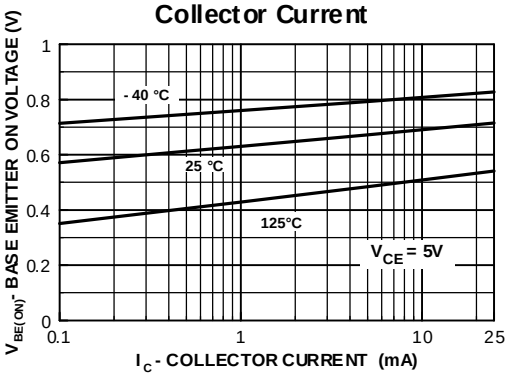
Collector-Emitter Saturation Voltage vs Collector Current



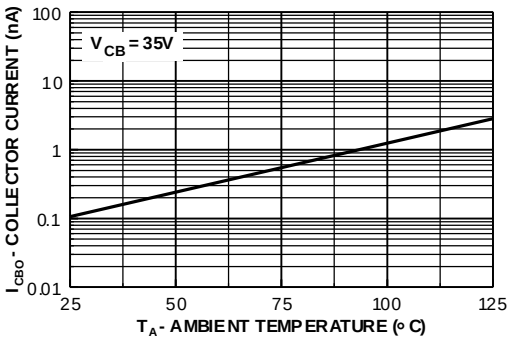
Base-Emitter Saturation Voltage vs Collector Current



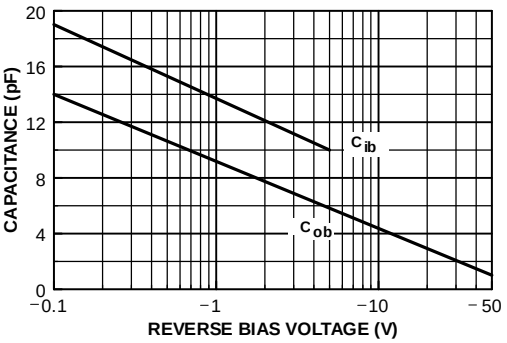
Base Emitter ON Voltage vs Collector Current



Collector-Cutoff Current vs Ambient Temperature



Input and Output Capacitance vs Reverse Bias Voltage



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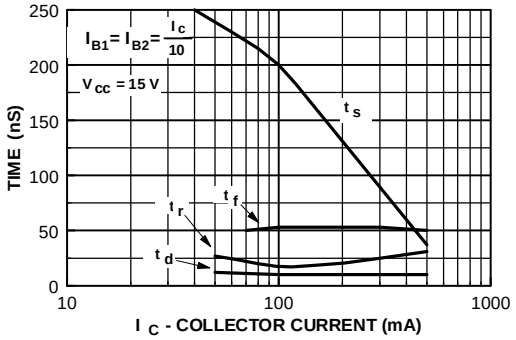
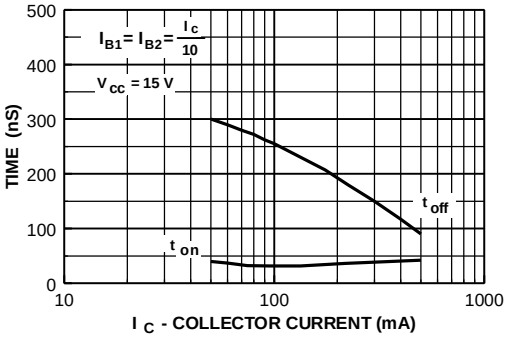
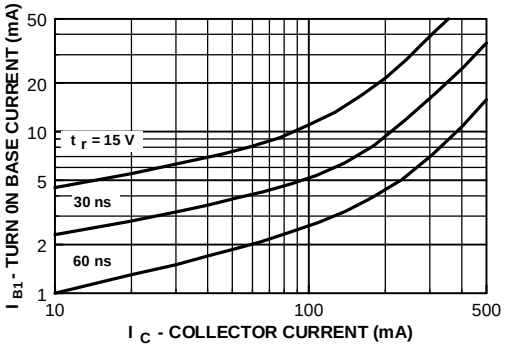
Switching Times vs Collector Current



Turn On and Turn Off Times vs Collector Current



Rise Time vs Collector and Turn On Base Currents



Power Dissipation vs Ambient Temperature